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Docket No: Q76217

Kenji TSUKADA

Appln. No.: 10/601,200

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Examiner: Ly T. TRAN

Filed: June 23, 2003

For: LIQUID EJECTING APPARATUS AND METHOD FOR CLEANING THE SAME

**SUBMISSION OF A VERIFIED TRANSLATION
OF THE PRIORITY DOCUMENT**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Further to the Amendment under 37 C.F.R. § 1.111 filed on February 2, 2006, Applicant is submitting herewith a verified translation of the priority document *i.e.*, Japanese Patent Application No. 2002-18154 filed June 21, 2002, thereby perfecting Applicant's claim to foreign priority.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly invited to contact the undersigned attorney at the telephone number listed below.


SUBMISSION OF VERIFIED TRANSLATION

U.S. Appln. No. 10/601,200

Attorney Docket No.: Q76217

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,


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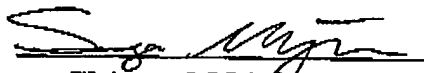
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STATEMENT

I, Shinya MOTOYAMA—of ARK Mori Building, 13F, 12-32, Akasaka 1-chome, Minato-ku, Tokyo 107-6013 Japan—hereby state that I am conversant in both Japanese and English and that I believe the following is true and correct translations of Japanese Patent Application No. 2002-181654 filed June 21, 2002.

Date: February 28, 2006


Shinya MOTOYAMA

PATENT OFFICE
JAPANESE GOVERNMENT

This is to certify that the annexed is a true copy of
the following application as filed with this Office.

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Application Number : Japanese Patent Application
No. 2002-181654

Applicant : SEIKO EPSON CORPORATION



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[Title of the Invention]

Liquid ejecting apparatus and cleaning method

[Claim(s)]

[Claim 1] A liquid ejecting apparatus characterized in that in a liquid ejecting apparatus comprising:

a liquid ejecting head opened with a plurality of nozzles for delivering a liquid and mounted to a carriage; and

a wiping member for wiping an opening portion of the nozzle by slidably moving on the liquid ejecting head by moving in a horizontal direction relative to the carriage;

wherein the wiping member is provided with stopping means for stopping to hold the wiping member relative to the carriage for a predetermined time period in a state of being brought into press contact with the liquid ejecting head after wiping the liquid ejecting head.

[Claim 2] The liquid ejecting apparatus according to Claim 2, characterized in that the carriage is provided with a plate on which the wiping member slidably moves in the state of being brought into press contact therewith after the wiping member have slidably moved on the liquid ejecting head;

wherein the plate is a plate having an inclined face of an inclination rising as departing from the liquid ejecting head; and

wherein the stopping means temporarily stops the wiping

member in a state of being brought into press contact with the plate.

[Claim 3] The liquid ejecting apparatus according to Claim 1 or 2, characterized in that wherein the wiping member comprises an elastic material and is arranged such that a wiping face for wiping the opening portion of the nozzle is inclined relative to the horizontal direction by a predetermined angle.

[Claim 4] The liquid ejecting apparatus according to Claim 3, characterized in that the wiping member is moved relative to the carriage in a second horizontal direction substantially orthogonal to the horizontal direction with the wiping face as a front face after having been stopped for a predetermined time period in the state of being brought into press contact therewith.

[Claim 5] The liquid ejecting apparatus according to Claim 3 or Claim 4, characterized in that a horizontal sectional shape of the wiping member is constituted by a rectangular shape and a longitudinal direction thereof is arranged to be substantially in parallel with the second horizontal direction substantially orthogonal to the horizontal direction.

[Claim 6] The liquid ejecting apparatus according to any one of Claims 1 through 4, characterized in that the wiping member comprises an elastic member and is released from the state of being brought into press contact therewith by being moved in a direction substantially orthogonal to a direction

of being bent when the wiping member is brought into press contact therewith after having been stopped for the predetermined time period in the state of being brought into press contact therewith.

[Claim 7] The liquid ejecting apparatus according to any one of Claims through 6, characterized in that a front end of the wiping member is constituted by a converging shape.

[Claim 8] A cleaning method characterized in that in a cleaning method in which a wiping member is moved in a horizontal direction relative to a carriage, and while slidingly moving on a liquid ejecting head formed with a plurality of nozzles for delivering a liquid at a lower face thereof and mounted to the carriage, wipes an opening portion of the nozzle;

wherein the wiping member is released from a state of being brought into press contact with the liquid ejecting head after a position thereof relative to the carriage is stopped to hold for a predetermined time period in a state of being brought into press contact therewith after wiping the nozzle of the liquid ejecting head.

[Claim 9]

The cleaning method according to Claim 8, characterized in that the carriage is provided with a plate having an inclined face a side of the liquid crystal ejection head of which constitutes a lowermost portion and the wiping member is stopped to hold in a state of being brought into press contact with

the plate after wiping the liquid ejecting head.

[Claim 10] The cleaning method according to Claim 8 or 9, characterized in that the wiping member is released from the state of being brought into press contact therewith by moving relative to the carriage in a direction substantially orthogonal to the horizontal direction.

[Detailed Description of the Invention]

[0001]

[Technical Field to which the Invention Belongs]

The present invention relates to a liquid ejecting apparatus and a cleaning method, in details, relates to a liquid ejecting method mounting a liquid ejecting head for ejecting a liquid to a carriage and ejecting a liquid to a target by moving the carriage relative to the target and a cleaning method.

[0002]

[Prior Art]

For example, there is an ink jet type printer for printing by ejecting a plurality of ink drops as an apparatus of ejecting an extremely small amount of a liquid to a target. The printer of this kind is provided with a recording head formed with a plurality of nozzles each having a very small opening portion and each ink drop is delivered from the opening portion of each nozzle. For that purpose, the printer is provided with a wiping member for maintenance cleaning. In finishing the maintenance cleaning, the wiping member serves to slidingly move on a lower

face of the recording head, wipe ink adhered to the opening portion of the nozzle and a surrounding thereof, remove extra ink adhered to the lower face and regulate a meniscus of ink at a front end portion of the nozzle.

[0003]

[Subject to be Accomplished by the Invention]

However, the wiping member is ordinarily constituted by an elastic member and is bent when sliding on the opening portion of the nozzle (in order to sufficiently remove ink). Therefore, when the wiping member wipes the opening portion of the nozzle and is detached from the recording head, the wiping member rapidly recovers by a recovery force thereof. That is, when the wiping member recovers from a bent state, ink adhered to a front end of the wiping member scatters to the surrounding by the wiping operation to contaminate the surrounding, that is, an inner side of the printer.

[0004]

The invention has been carried out in view of the above-described problem for providing a liquid ejecting apparatus and a cleaning method capable of restraining a liquid from being scattered by a wiping member which has finished wiping an opening portion of a nozzle to thereby less contaminate an inner portion thereof.

[0005]

[Means for Solving the Problems]

In order to resolve the above-described problem, the invention described in Claim 1 constitutes a gist thereof by that in a liquid ejecting apparatus comprising a liquid ejecting head opened with a plurality of nozzles for delivering a liquid and mounted to a carriage, and a wiping member for wiping an opening portion of the nozzle by slidably moving on the liquid ejecting head by moving in a horizontal direction relative to the carriage, wherein the wiping member is provided with stopping means for stopping to hold the wiping member relative to the carriage for a predetermined time period in a state of being brought into press contact with the liquid ejecting head after wiping the liquid ejecting head.

[0006]

The invention described in Claim 2 constitutes a gist thereof in the liquid ejecting apparatus described in Claim 1 by that the carriage is provided with a plate on which the wiping member slidably moves in the state of being brought into press contact therewith after the wiping member have slidably moved on the liquid ejecting head, wherein the plate is a plate having an inclined face of an inclination rising as departing from the liquid ejecting head, and the stopping means temporarily stops the wiping member in a state of being brought into press contact with the plate.

[0007]

The invention described in Claim 3 constitutes a gist

thereof in the liquid ejecting apparatus according to Claim 1 or 2 by that the wiping member comprises an elastic material and is arranged such that a wiping face for wiping the opening portion of the nozzle is inclined relative to the horizontal direction by a predetermined angle.

[0008]

The invention described in Claim 4 constitutes a gist thereof in the liquid ejecting apparatus according to Claim 3 by that the wiping member is moved relative to the carriage in a second horizontal direction substantially orthogonal to the horizontal direction with the wiping face as a front face after having been stopped for a predetermined time period in the state of being brought into press contact therewith.

[0009]

The invention described in Claim 5 constitutes a gist thereof in the liquid ejecting apparatus according to Claim 3 or Claim 4 by that a horizontal sectional shape of the wiping member is constituted by a rectangular shape and a longitudinal direction thereof is arranged to be substantially in parallel with the second horizontal direction substantially orthogonal to the horizontal direction.

[0010]

The invention described in Claim 6 constitutes a gist thereof in the liquid ejecting apparatus according to any one of Claims 1 through 5 by that the wiping member comprises an

elastic member and is released from the state of being brought into press contact therewith by being moved in a direction substantially orthogonal to a direction of being bent when the wiping member is brought into press contact therewith after having been stopped for the predetermined time period in the state of being brought into press contact therewith.

[0011]

The invention described in Claim 7 constitutes a gist thereof in the liquid ejecting apparatus according to any one of Claims 1 through 6 by that a front end of the wiping member is constituted by a converging shape.

[0012]

The invention described in Claim 8 constitutes a gist thereof by that in a cleaning method in which a wiping member is moved in a horizontal direction relative to a carriage, and while slidably moving on a liquid ejecting head formed with a plurality of nozzles for delivering a liquid at a lower face thereof and mounted to the carriage, wipes an opening portion of the nozzle, wherein the wiping member is released from a state of being brought into press contact with the liquid ejecting head after a position thereof relative to the carriage is stopped to hold for a predetermined time period in a state of being brought into press contact therewith after wiping the nozzle of the liquid ejecting head.

[0013]

The invention described in Claim 9 constitutes a gist thereof in the cleaning method according to Claim 8 by that the carriage is provided with a plate having an inclined face a side of the liquid crystal ejection head of which constitutes a lowermost portion and the wiping member is stopped to hold in a state of being brought into press contact with the plate after wiping the liquid ejecting head.

[0014]

The invention described in Claim 10 constitutes a gist thereof in the cleaning method according to Claim 8 or 9 by that the wiping member is released from the state of being brought into press contact therewith by moving relative to the carriage in a direction substantially orthogonal to the horizontal direction.

[0015]

(Operation)

According to the invention described in Claim 1 or 8, the wiping member is temporarily stopped in a state of being brought into press contact therewith after wiping the nozzle. That is, by temporarily stopping the wiping member, before the wiping member is released from the state of being brought into press contact therewith, the liquid adhered to the wiping member by the wiping operation flows down. Therefore, when the wiping member recovers by being released from the state of being brought into press contact therewith, the liquid hardly adheres to the

front end of the wiping member. Therefore, scattering of the liquid to the surrounding by impact of recovering the wiping member from the state of being brought into press contact therewith can be reduced and contamination of the inner portion of the liquid ejecting apparatus can further be reduced.

[0016]

According to the invention described in Claim 2 or Claim 9, the wiping member is stopped in the state of being brought into press contact with the plate provided at the carriage and therefore, a total of the liquid ejecting head can firmly and easily be wiped. Further, a side of the liquid ejecting head of the plate constitutes a lowermost portion and therefore, the liquid adhered to the plate is gathered to the side of the liquid ejecting head. Therefore, the liquid adhered to the front end of the wiping member can sufficiently be made to flow down by stopping in a state of being brought into press contact with the upper portion of the plate after sufficiently removing the liquid of the plate which is gathered to the side of the liquid ejecting head. Therefore, when the liquid is ejected from the liquid ejecting head, the liquid can further firmly be prevented from dropping from the plate to the target.

[0017]

According to the invention described in Claim 3, the wiping face of the wiping member is arranged skewedly to the horizontal direction in which the wiping member moves relative to the

carriage. Therefore, the wiping member gradually wipes the lower face of the liquid ejecting head by being brought into press contact with the liquid ejecting head and therefore, load applied to the wiping member can be reduced in starting to wipe ink and the wiping member can be used for a longer period of time.

[0018]

According to the invention described in Claim 4, the wiping member is moved relatively in the second horizontal direction substantially orthogonal to the horizontal direction by constituting the front face by the wiping face arranged skewedly to the horizontal direction. Therefore, even when movement in the horizontal direction of the wiping member relative to the carriage is reduced, a large portion thereof can be wiped.

[0019]

According to the invention described in Claim 5 or 10, the wiping member is drawn in the longitudinal direction of the rectangular shape and therefore, that is, the wiping member is not released from the state of being brought into press contact therewith in one motion but is released gradually and therefore, scattering of the liquid forcedly in wide range is reduced and contamination can be restrained to a smaller range.

[0020]

According to the invention described in Claim 6, the wiping member is stopped for a predetermined time period in the state

of being brought into press contact therewith and thereafter moved in a direction substantially orthogonal to a direction of being bent when brought into press contact therewith and released from the press contact state. Therefore, the press contact state is not released in a direction of bending the wiping member and a direction opposed thereto, that is, the state of being bent is not released in one motion but is gradually released and therefore, scattering the liquid forcedly by forcedly recovering the bent state can be restrained.

[0021]

According to the invention described in Claim 7, the front end of the wiping member is constituted by the converging shape and therefore, the liquid adhered to the liquid ejecting head can sufficiently be wiped by bringing the front end into press contact with the liquid ejecting head and the like.

[0022]

[Mode for Carrying Out the Invention]

An embodiment of a liquid ejecting apparatus embodying the invention will be explained in reference to Fig. 1 through Fig. 10 as follows.

[0023]

As shown by Fig. 1, according to an ink jet type printer (hereinafter, referred to as printer) 11 as a liquid ejecting apparatus of the embodiment, a platen 13 is erected on a frame 12 thereof and paper P as a target is fed onto the platen 13

by a paper feeding mechanism, not illustrated. A carriage 14 is supported by the frame 12 movably in an axial direction of the platen 13 via a guide member 15 and is reciprocated in X direction (horizontal direction) by a carriage motor 16 via timing belt 17.

[0024]

Further, as shown by Fig. 2 and Fig. 3, the carriage 14 is mounted with a recording head 20 as a liquid ejecting head at a lower portion thereof. The recording head 20 is provided with a plurality of nozzles and is provided with a nozzle plate portion 21 at which respective opening portions of the nozzles are gathered to a center of a lower face thereof. The recording head 20 delivers an ink drop from the opening portion of each nozzle by driving a piezoelectric element, not illustrated.

[0025]

Further, the carriage 14 is attached with an inclined plate 23 at a very small clearance S from the recording head 20 at a lower portion on the right side of Fig. 3. A lower face of the inclined plate 23 is constituted by an inclined face and the inclined face is provided with an inclination which rises as departing from the recording head 20 in the horizontal direction (as progressing to the right side of Fig. 3). Further, at a right end portion of the inclined plate 23 in Fig. 1, an engaging portion 14a projected to the right side is integrally formed with the inclined plate 23.

[0026]

As shown by Fig. 1, ink cartridges 25 and 26 are attachably and detachably mounted on the carriage 14 and ink is supplied from the ink cartridges 25 and 26 to the recording head 20. The ink cartridge 25 is contained with ink of black color. Further, the ink cartridge 26 is a color ink cartridge, an inner portion thereof is partitioned in three chambers and the respective chambers are respectively contained with inks of three colors of cyan, magenta and yellow.

[0027]

Therefore, in the printer 11, while the carriage 14 is moving in X direction along the platen 13, ink supplied from the ink cartridges 25 and 26 is delivered from the recording head 20 onto the paper P by driving a piezoelectric element 22 based on printing data to thereby carry out printing.

[0028]

Meanwhile, as shown by Fig. 1, a head cleaning mechanism 30 is arranged at a nonprinting region at a right side portion of the frame 12. The head cleaning mechanism 30 is provided with a capping mechanism 31, a suction pump 32 and a wiping member 33.

[0029]

Describing in details, as shown by Fig. 2 and Fig. 3, a frame F of the capping mechanism 31 is provided with a slider 35 slidably supported thereby and a cap holder 36 is supported

by the slider 35. The slider 35 is provided with an engaging portion 35a and a spring member 37 is provided to expand between the slider 35 and the frame F at a lower side thereof. Therefore, the slider 35 is pivoted to a right upper side centering on a pin 38 against the spring member 37 by moving to a right side of the drawing by engaging the engaging portion 35a with the engaging portion 14a of the carriage 14. Further, when the engaging portion 35a is released from engagement with the engaging portion 14a, the slider 35 is pivoted to a left lower side centering on the pin 38 by recovery force of the spring member 37. Thereby, the cap holder 36 supported by the slider 35 can be moved in an up and down direction.

[0030]

Further, a capping member 39 in a square frame shape is projected from an upper face of the cap holder 36. The capping member 39 can be opposed to the nozzle plate portion 21 of the recording head 20 at a predetermined interval therebetween as shown by Fig. 6 and seals an opening portion of the nozzle of the nozzle plate portion 21 in accordance with a rise of the cap holder 36 as shown by Fig. 5. Further, as shown by Fig. 2, an opening hole 39a is formed at a center of the capping member 39. The capping member 39 is connected to the suction pipe 32 arranged on the lower side of the slider 36 shown in Fig. 1 via the opening hole 39a. Further, the suction pump 32 is connected to a waste ink tank 40 arranged in parallel

with the platen 13 via a suction pipe, not illustrated. Therefore, by the suction pump 32, negative pressure is applied to an inner space of the capping member 39 in a state of sealing the opening portion of the nozzle of the recording head 20 by the cap holder 36 and dry (more viscous) ink is sucked from the recording head 20 and is discharged to the waste ink tank 40.

[0031]

Meanwhile, as shown by Fig. 2 and Fig. 3, the wiping member 33 is provided on the left side of the cap holder 36 to constitute a predetermined angle α (for example, about 60 degrees) relative to X direction which is the direction of moving the carriage 14. As shown by Fig. 2, the wiping member 33 comprises an elastic material a horizontal sectional shape of which constitutes a rectangular shape and is provided to project on an upper side of the cap holder 36. Therefore, the wiping member 33 is brought into press contact with the recording head 20 and the inclined plate 23 to wipe to clean lower faces thereof. Further, according to the wiping member 33, a side thereof brought into sliding contact with the recording head 20 constitutes a recessed wiping face 33a, a side opposed thereto constitutes a bulged face 33b and a shape of a front end thereof constitutes a converging shape of substantially a V-like shape. Further, the wiping member 33 is provided with a moving apparatus, not illustrated, at a lower portion thereof and is made to be movable

in a second horizontal direction (Y direction) orthogonal to the X direction by driving the moving apparatus.

[0032]

Further, the printer 11 is provided with a case, not illustrated, and the case is provided with a power source switch SW and a cleaning switch CSW at a vicinity of a home position as shown by a two-dotted chain line of Fig. 1.

[0033]

Next, an electric constitution of the printer 11 will be explained in reference to Fig. 4.

The printer 11 is provided with CPU 45. CPU 45 is connected to RAM 46 and RAM 46 is temporarily stored with printing data. Further, the CPU 45 is connected to ROM 47, reads pertinently various programs of a printing program, a cleaning program and the like stored to the ROM 47 and carries out predetermined processings in accordance with the programs.

[0034]

Further, the CPU 45 is connected to respective driving portions of a feeding motor driving portion 51, a moving motor driving portion 52, a head driving portion 53, a suction motor driving portion 54 and a wiping member moving motor driving portion 55. The feeding motor driving portion 51 drives a paper feeding motor 56, not illustrated, the paper feeding motor 56 drives a paper feeding roller, not illustrated, to carry paper to guide onto the platen or discharge. Further, the moving

motor driving portion 52 drives the carriage motor 16 to thereby move the carriage 14 in the X direction. Further, the head driving portion 53 makes ink delivered from the nozzle by driving the piezoelectric element, not illustrated, provided at the recording head 20.

[0035]

Further, the suction motor driving portion 54 drives the suction pump 32 to thereby suck ink of the capping member 39 to discharge to the wasting tank 40. Further, the wiping member moving motor driving portion 55 drives in the above-described moving apparatus, not illustrated, to thereby move the wiping member 33 in Y direction.

[0036]

Meanwhile, the CPU 45 switches on or cuts off the power source of the printer in accordance with depression of the power source switch SW, mentioned above, and starts cleaning operation in accordance with depression of the cleaning switch CSW. Further, the printer 11 is connected to a personal computer, not illustrated, having a keyboard, a mouse and a monitor. Therefore, CPU 45 of the printer 11 receives instruction of bringing or displaying a signal of finishing of printing on the monitor via the personal computer in accordance with operation of the personal computer, not illustrated, of a user via the keyboard or the mouse.

[0037]

Next, cleaning operation of the above-described printer 11 will be explained in reference to Fig. 5 through Fig. 10.

In a state in which operation is at standby for printing or the power source is cut, the carriage 14 is disposed at the nonprinting region, as shown by Fig. 5, the engaging portion 14a is engaged with the engaging portion 34a of the slider 35, the cap holder 36 of the slider 35 rises and the capping member 39 seals the nozzle plate portion 21 of the recording head 20.

[0038]

When the cleaning switch CSW is depressed from the state, the cleaning operation is started. CPU 45 makes ink of a predetermined amount sucked by the suction pump 32 from the recording head 20 by driving the suction motor driving portion 54. Further, substantially simultaneously therewith, CPU 45 moves the wiping member 33 to a position of wiping the nozzle plate (position indicated by a bold line in Fig. 2 and Fig. 9) by driving the wiping member moving motor driving portion 55. After sucking ink from the recording head 20, CPU 45 moves the carriage 14 to the left side by driving the moving motor driving portion 52 to bring about a state shown in Fig. 6. At this occasion, the slider 35 is pivoted to the left lower side by recovery force of the spring member 37 since engagement between the engaging portion 34a and the engaging portion 14a of the carriage 14 is released, the cap holder 36 is lowered and sealing of the nozzle plate 21 by the capping member 39

is released.

[0039]

Further, when CPU 45 moves the carriage 14 to the left side, as shown by Fig. 7 and Fig. 8, the wiping member 33 wipes the nozzle plate portion 21 by being brought into sliding contact with the lower face of the recording head 20 of the carriage 14. Further, ink wiped by the wiping member 33 flows down to the lower side of the wiping member 33 by conducting the side of the wiping face 33a.

[0040]

Further, when the wiping member finishes wiping the recording head, the wiping member 33 is brought into sliding contact with a lower face of the inclined plate 23 successively in accordance with movement of the carriage 14 to wipe the lower face. Further, when one end portion 33c of the wiping member 33 moves to the inclined plate 23, other end portion 33d thereof is still disposed at the recording head 20 and slidably moved to ride over the clearance S and therefore, the front end of the wiping member 33 is not brought into the clearance S. Therefore, ink adhered to the front end is less scattered to an outer periphery thereof by releasing the wiping member 33 from a state of being brought into the clearance S to be brought into press contact therewith.

[0041]

Successively, as shown by the bold line of Fig. 9 and

Fig. 10, when the wiping member 33 is brought into a state of being brought into press contact with the lower face of the inclined plate 23 after finishing to wipe the lowermost portion, CPU 45 of the printer 11 stops the carriage 14 by temporarily stopping to drive the moving motor driving portion 52. That is, the wiping member 33 is temporarily stopped to hold in a state of being bent by being brought into press contact with the inclined plate 23. Further, during a time period in which the wiping member 33 is stopped to hold, the most portion of ink adhered to the front end by the wiping operation flows down to the lower side of the wiping member 33 mainly from the side of the wiping face 33a.

[0042]

Further, after stopping the carriage 14 for a predetermined time period (for example, 5 seconds) in the state of bending the wiping member 33, the CPU 45 moves the wiping member 33 in Y direction as shown by an imaginary line of Fig. 9 by driving the wiping member moving motor driving portion 55. Thereby, the wiping member 33 wipes the lower face of the inclined plate 23 while moving in Y direction to be drawn from the longitudinal direction, that is, to recover the bending from the side of the other end portion 33d. Further, the CPU 45 finishes the cleaning processing after recovering the carriage 14 to a position shown in Fig. 6.

[0043]

According to the printer 11 of the embodiment, the following effect can be achieved.

According to the embodiment, the wiping member 33 wipes the lower side of the recording head 20 by moving the carriage 14 in X direction. Further, the carriage 14 is stopped to move for the predetermined time period in a state of Fig. 10 in which the wiping member 33 reaches the inclined plate 23 after wiping the recording head 20. That is, the wiping member 33 is stopped in a state of being brought into press contact with the inclined plate 23 and therefore, ink adhered to the wiping member 33 by the wiping operation sufficiently flows down to the lower side. Therefore, when the wiping member 33 is released from the state of being brought into press contact by leaving the inclined plate 23 and the front end recovers, ink is hardly adhered to the front end of the wiping member 33. Therefore, even when the wiping member 33 is released from the state of being brought into press contact, ink hardly scatters to the surrounding and contamination of the inner portion of the printer 11 by ink can be reduced.

[0044]

According to the embodiment, the wiping member 33 is temporarily stopped when the wiping member 33 is disposed at the inclined plate 23 provided on the right side of the recording head 20 (rear side of recording head 20). Therefore, not only a total of the recording head 20 is firmly and easily wiped

but also contamination by ink adhered to the wiping member 33 can be reduced. Further, the lowermost portion of the inclined plate 23 is disposed on the side of the recording head 20 and therefore, ink adhered to the inclined plate 23 is gathered to the side of the recording head 20. Therefore, even ink which is scattered to adhere to the inclined plate 23 can sufficiently be wiped and ink can more firmly be prevented from dropping from the inclined plate 23 in printing operation.

[0045]

According to the embodiment, the wiping face 33a of the wiping member 33 is arranged skewedly to X direction of moving the carriage 14. That is, the wiping member 33 wipes ink by being brought into press contact with the recording head 20 gradually from the one end portion 33c and therefore, in starting the wiping operation, load applied to the wiping member 33 can be reduced and the wiping member 33 can be used for a longer period of time. Further, since the wiping member 33 is inclined to X direction, in moving from the recording head 20 to the inclined plate 23, the front end is not brought into the clearance S, that is, contamination of the surrounding by scattering ink adhered to the front end by bringing the front end into the clearance S and thereafter recovering the front end can be reduced.

[0046]

According to the embodiment, the inclined plate 23 with

which the wiping member 33 is brought into press contact is formed separately from the recording head 20 and is attached to the carriage 14 at the clearance S from the recording head 20. Therefore, the inclined plate 23 can easily be attached thereto since it is not necessary to provide the inclined plate 23 is strict tolerance.

[0047]

According to the embodiment, after temporarily stopping the wiping member 33 brought into press contact with the inclined plate 23, the wiping member 33 is moved in Y direction orthogonal to X direction such that a front face thereof is constituted by the wiping face 33a. That is, when the one end portion 33c of the wiping member 33 is disposed at an end portion of the inclined plate 23 in stopping the carriage 14, even when the other end portion does not reach the end portion of the inclined plate 23, by moving the wiping member 33 in Y direction thereafter, the wiping face 33a wipes a total of the inclined plate 23. That is, even when movement of the wiping member 33 in X direction is reduced, more portions can be wiped.

[0048]

According to the embodiment, after the wiping member 33 is stopped temporarily, the wiping member 33 is relatively moved in Y direction which is substantially the same as the longitudinal direction. That is, the wiping member 33 is not released in one motion from the state of being brought into

press contact therewith but released gradually and therefore, ink is less scattered forcibly in a wide range and contamination thereof can be restrained to a small range.

[0049]

According to the embodiment, the wiping member 33 is temporarily stopped in the state of being brought into press contact with the inclined plate 23 and thereafter removed in Y direction substantially orthogonal to X direction in which the front end is bent in wiping the recording head 20 and the inclined plate 23. Therefore, the front end of the wiping member 33 is not recovered to a direction of being bent and a direction opposed thereto, that is, X direction but is gradually recovered to the original shape from Y direction and therefore, it can be restrained that bending of the wiping member 33 is forcibly recovered and ink is forcibly scattered.

[0050]

According to the embodiment, the front end of the wiping member 33 is formed by the converging shape of the substantially V-like shape and therefore, by bringing the front end into press contact with the recording head 20, ink drops adhered to the surface of the recording head 20 can sufficiently be wiped.

[0051]

According to the embodiment, the wiping face 33a of the wiping member 33 is constituted by a slightly recessed shape and therefore, when the wiping member 33 is bent to wipe ink,

ink adhered to the front end of the wiping face 33a becomes easy to flow to the lower side. Therefore, ink can be dropped to the lower side swiftly without stagnating ink at a middle of the wiping face 33a of the wiping member 33.

[0052]

(Modified Example)

Further, the above-described embodiment may be modified as follows.

○ Although according to the above-described embodiment, the inclined plate 23 is provided on the rear side of the recording head 20, the inclined plate 23 may not be provided. In this case, after wiping the nozzle plate portion 21 of the recording head 20, the wiping member 33 may be temporarily stopped in the state of being brought into press contact with the recording head 20. Further, in this case, when the rear side of the recording head 20, that is, a portion thereof on the rear side of the nozzle plate portion 21 is inclined upwardly, ink adhered to a rear end portion thereof gathers to the side of the recording head 20 which is lower than the rear side and therefore, even when the wiping member 33 does not wipe a total of the rear end portion, the wiping member 33 can sufficiently wipe the recording head 20.

[0053]

○ Although according to the above-described embodiment, a description has been given of the printer 11 mounted with

the ink cartridges 25 and 26 at the carriage 14, naturally, the embodiment may be applied to the printer 11 which is not mounted with the ink cartridges 25 and 26 at the carriage 14 but is fixed therewith.

[0054]

○ According to the above-described embodiment, when the lower face of the recording head 20 is wiped, the carriage 14 is moved in X direction without moving the wiping member 33 and after the wiping member 33 is temporarily stopped, the carriage 14 is stopped and the wiping member 33 is moved in Y direction. In stead thereof, the wiping member 33 may be moved in X direction and Y direction without moving the carriage 14 and the carriage 14 may be moved also in Y direction. That is, so far as the carriage 14 mounted with the recording head 20 and the wiping member 33 are moved relative to each other, either thereof may be moved. Further, when the wiping member 33 is stopped to hold relative to the carriage 14, the carriage 14 or the wiping member 33 which is actually moved may be stopped.

[0055]

○ Although according to the above-described respective embodiments, an explanation has been given of a printer delivering ink (printing apparatus including facsimile, copier or the like) as a liquid ejecting apparatus, the embodiment may be a liquid ejecting apparatus ejecting other liquid. For example, the embodiment may be a liquid ejecting apparatus for

ejecting an electrode material or a color material used in fabricating a liquid crystal display, an EL display and a face luminescent display, a liquid ejecting apparatus for ejecting an organic substance of a living body used in fabricating a biochip, or a sample ejecting apparatus as a fine pipet.

[0056]

[Effect of the Invention]

According to the invention, by temporarily stopping the wiping member in the state of being brought into press contact after wiping the nozzle, the liquid adhered to the front end by the wiping operation flows down to the lower side. Thereafter, the wiping member is recovered by releasing the press contact state and therefore, the wiping member is hardly adhered with the liquid which has been adhered to the front end, scattering of the liquid to the surrounding is reduced and contamination of inner portion of the liquid ejecting apparatus can be reduced.

[Brief Explanation of the Drawings]

[Figure 1]

Fig. 1 is an outline perspective view of a total of a printer according to an embodiment.

[Figure 2]

Fig. 2 is a plane view of an essential portion of a head cleaning mechanism of the printer of Fig. 1.

[Figure 3]

Fig. 3 is a front view of the essential portion of the

head cleaning mechanism of the printer of Fig. 1.

[Figure 4]

Fig. 4 is a block diagram showing an electric constitution of the printer of Fig. 1.

[Figure 5]

Fig. 5 is a front view of an essential portion in sucking operation showing a positional relationship between a recording head and a wiping member.

[Figure 6]

Fig. 6 is a front view of the essential portion in finishing cleaning showing a positional relationship between the recording head and the wiping member.

[Figure 7]

Fig. 7 is a plane view of an essential portion showing the wiping operation of the wiping member for wiping the recording head.

[Figure 8]

Fig. 8 is a front view of the essential portion showing the wiping operation of the wiping member for wiping the recording head.

[Figure 9]

Fig. 9 is a plane view of the essential portion showing the wiping operation of the wiping member after wiping the recording head.

[Figure 10]

Fig. 10 is a front view of the essential portion showing the wiping operation of the wiping member after wiping the recording head.

[Description of Reference Numerals and Signs]

11 Printer as liquid ejecting apparatus

14 Carriage

20 Recording head as liquid ejecting head

23 Inclined plate as plate

33 Wiping member

33a Wiping face

45 CPU as stopping means

α Predetermined angle

[Designation of Document] Abstract

[Abstract]

[Problem] To provide a liquid ejecting apparatus and a cleaning method capable of restraining a liquid from being scattered by a wiping member which has finished wiping an opening portion of a nozzle to thereby further reduce contamination of an inner portion of the liquid ejecting apparatus.

[Means for Resolution] By moving a carriage 14 in X direction, a recording head 20 provided on a lower side of the carriage 14 is wiped by a wiping member 33. When the carriage 14 is further moved in X direction, the wiping member 33 is brought into a state of being brought into press contact with an inclined plate 23 disposed on the rear side of the recording head 20 to wipe and movement of the carriage 14 is stopped. That is, the wiping member 33 is stopped for a predetermined time period in a state of being brought into press contact with the inclined plate 23 and ink adhered to the wiping member 33 by wiping operation flows down to a lower side. Thereafter, the wiping member 33 is moved and released from the inclined plate 23.

[Selected Drawing] Fig. 10

整理番号: J0091645 出願番号: 特許願2002-181654

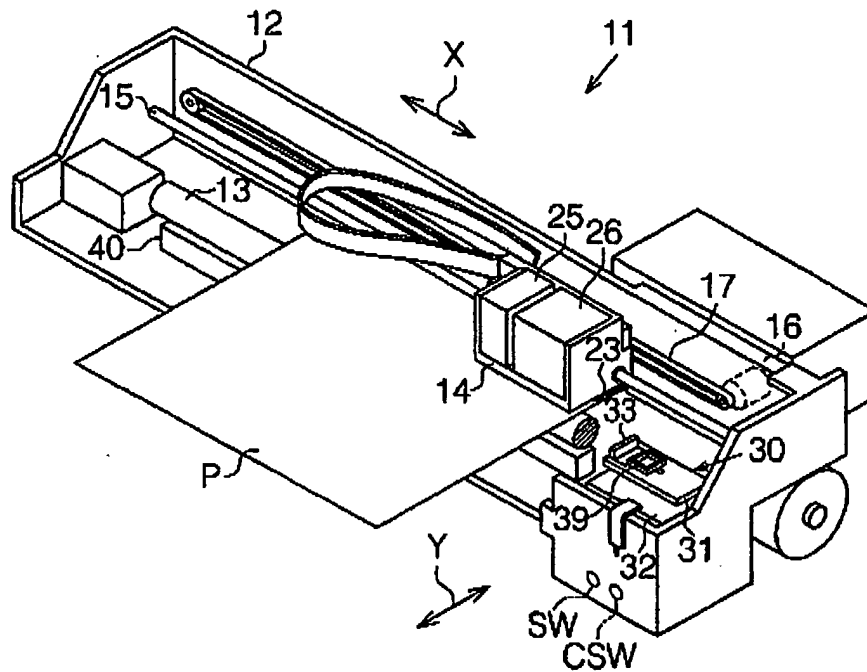
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DESIGNATION OF DOCUMENT

【書類名】 ~~図面~~ DRAWINGS

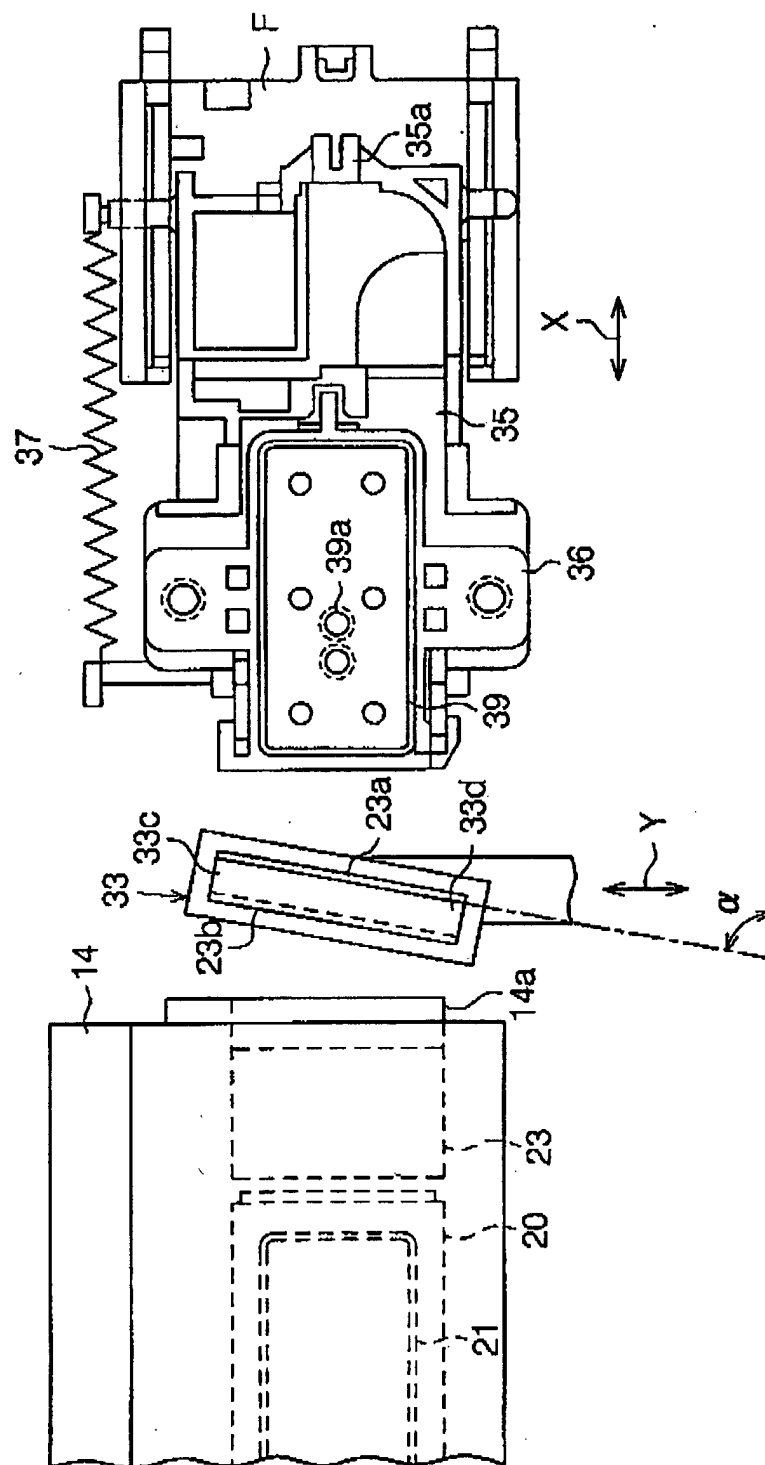
【図1】

凡例



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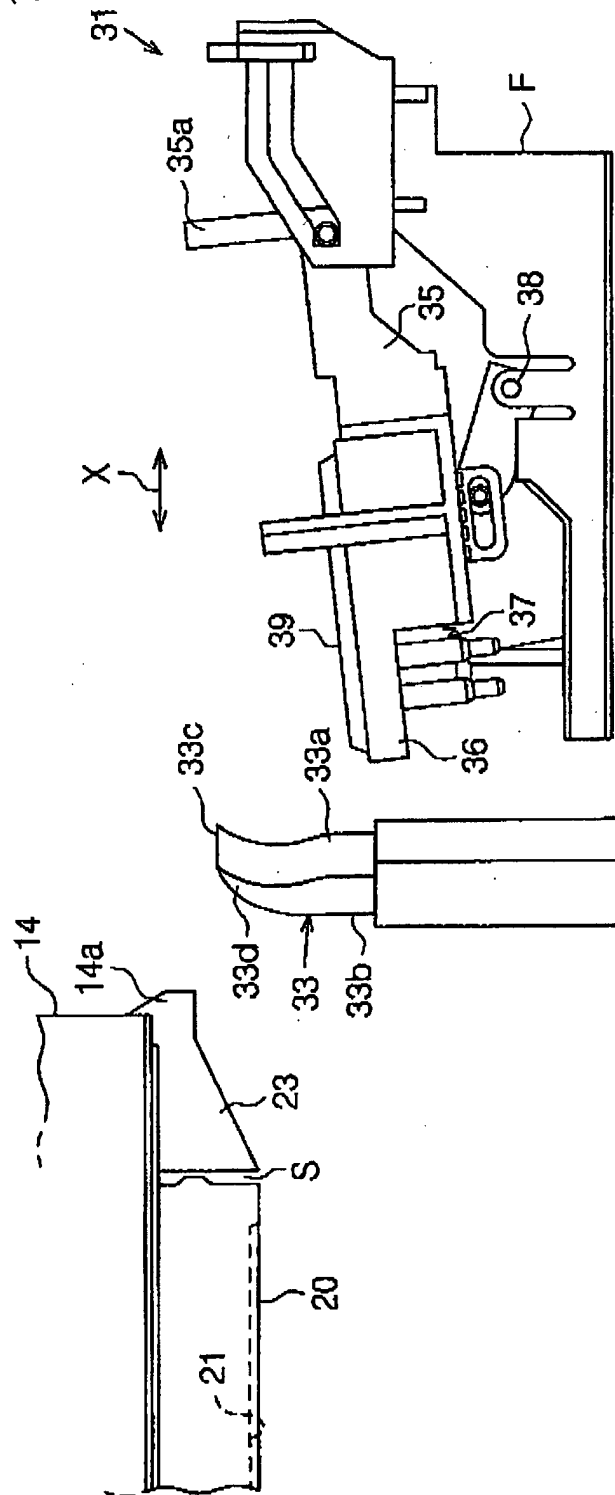
【図2】
FIG. 2

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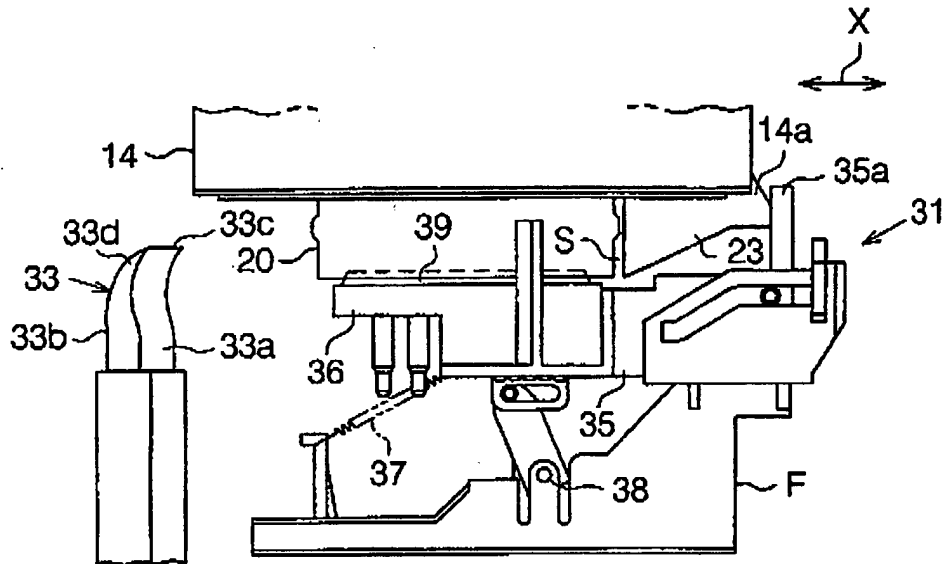
[図3]

FIG. 3



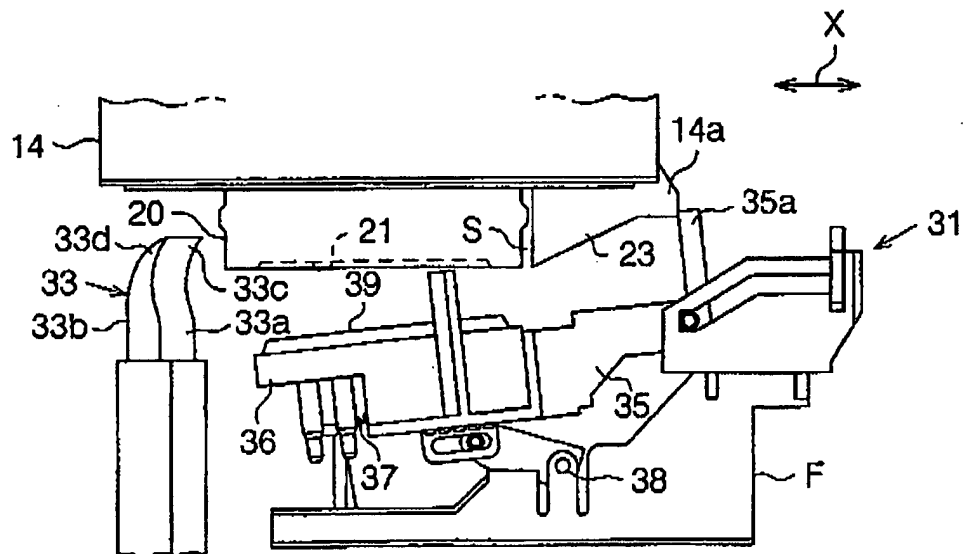
【図5】

FIG. 5



【図6】

FIG. 6

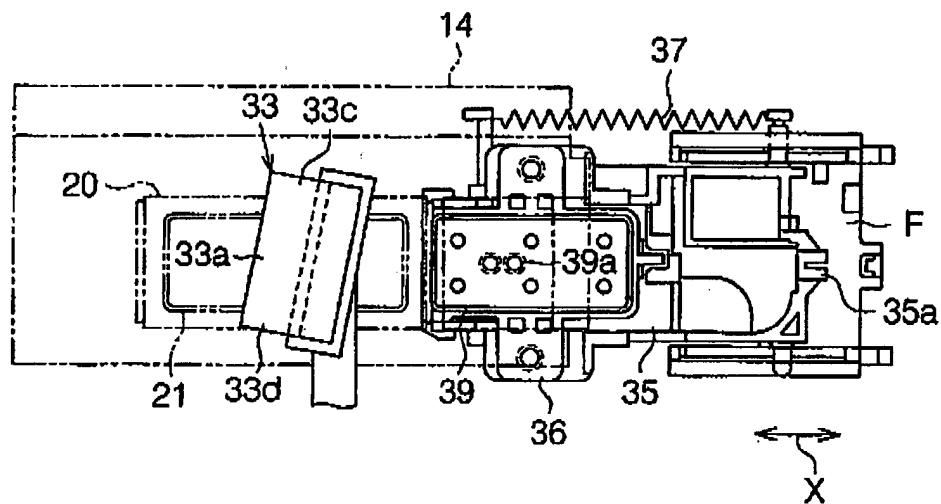


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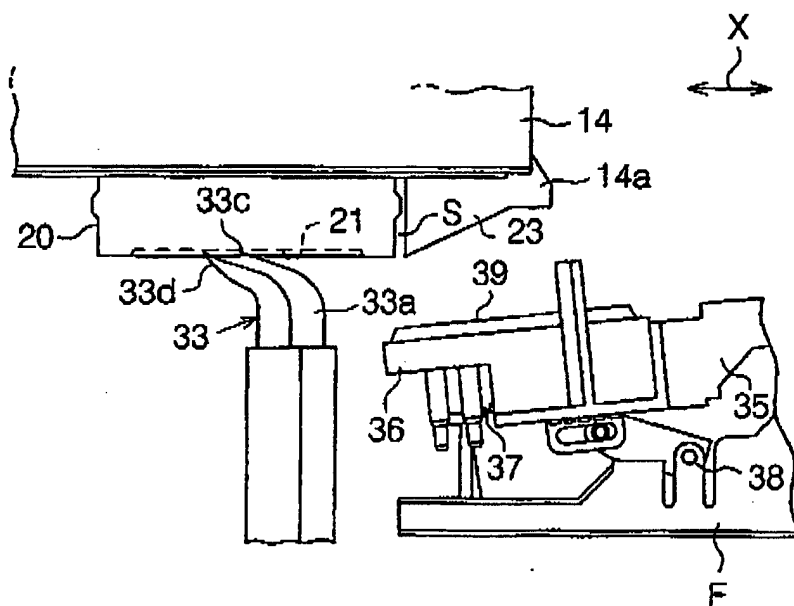
【図7】

FIG. 7



【図8】

FIG. 8

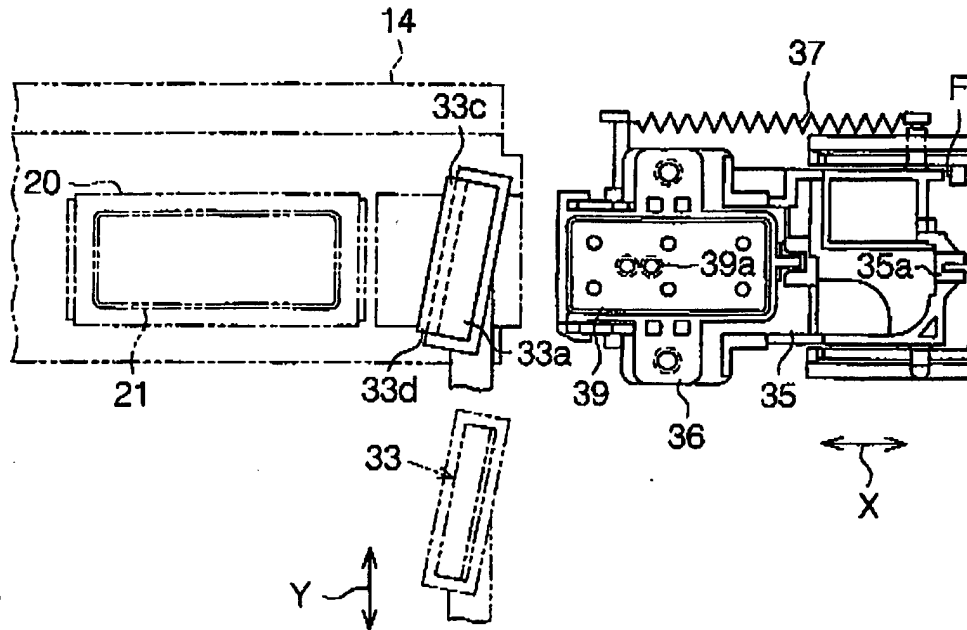


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【図9】

FIG. 9



【図10】

FIG. 10

